National Institutes of Health

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

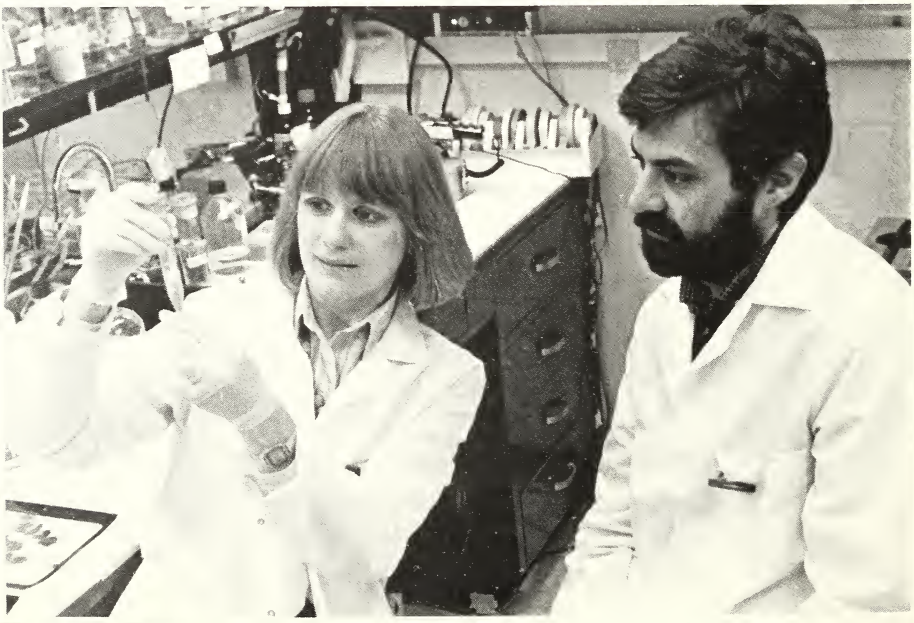
National Institutes of Health

NIH: Investing in the Nation's Health

A 50-year-old man recovering from a heart attack adds years to his life with new drugs and other treatments that slow his heart rate and allow blood to flow freely to his heart muscle. Less than 50 years ago, he might not have survived at all.

A physician in New York City tells a young woman with Hodgkin's lymphoma, a once-fatal cancer of the lymphatic system, that she has an 80 percent chance of being cured with anti-cancer drugs.

An infant from Kansas City with respiratory distress syndrome—an immaturity of the lungs that affects 40,000 premature babies each year—survives thanks to a new diagnostic



test and a special air pressure treatment that prevents his lungs from collapsing.

Hundreds of thousands of young people—who once might have suffered tooth decay, painful toothaches, and tooth loss—have healthy teeth following the discovery that fluoride safely and effectively reduces the incidence of dental caries.

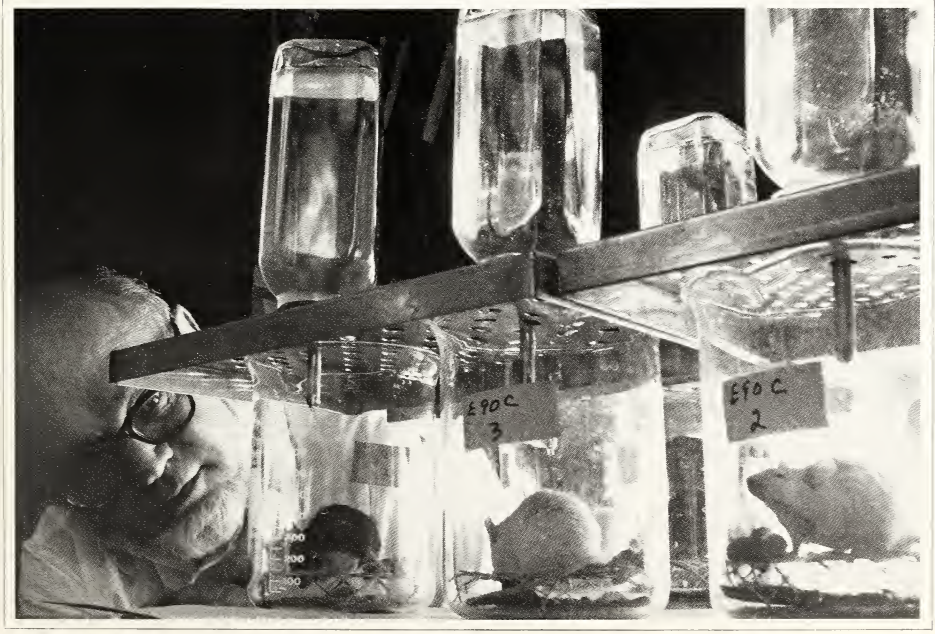
These stories describe payoffs of the United States' investment in the health of its citizens: the National Institutes of Health. What is the NIH? How does it help scientists produce these medical marvels? Where do they take place, and who makes them happen? Where do the

nation's top scientists hope these efforts will lead in the future?

Organizationally, the NIH is one of the five health agencies of the Public Health Service, which, in turn, is part of the U.S. Department of Health and Human Services. The Nation's confidence in its investment in health through the NIH has been expressed by continued commitment to NIH's growth since 1887:

- Physically, from a one-room laboratory in the attic of the Marine Hospital on Staten Island, NY, to more than 40 buildings on 300 acres in Bethesda, Maryland, about 10 miles from downtown Washington, DC.

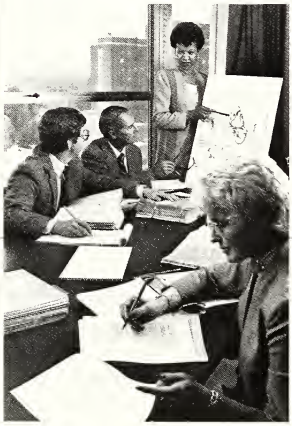
- Fiscally, from a budget of about $300 the first time the laboratory spent money for medical research in 1887, to its present budget of about $6 billion.
- Functionally, from a small Federal laboratory performing its own research to the world's largest biomedical research organization.
- Scientifically, from a limited effort to conquer cholera and other infectious diseases to a large-scale commitment to improve the Nation's health by acquiring new knowledge to help prevent, detect, diagnose, and treat disease and disability, from the rarest genetic disorder to the common cold.



The main purpose of the NIH is to invest wisely the tax dollars entrusted to it for the support and conduct of biomedical research. More than 80 percent of the investment is made through grants and contracts to fund research projects that comprise the NIH extramural program. Most of the remainder of the NIH budget goes to the intramural research program and its 2,000 projects conducted mainly in the NIH's laboratories in Bethesda. Generally speaking, most of the studies supported by NIH are basic research.

Final decisions about funding extramural studies are made at the NIH's Bethesda headquarters. But long before this happens, the process begins with an idea that an individual scientist describes in a written application for a research grant. The project might be small, or it might involve millions of dollars; it might be short-term, or it might be a 10-year study of the long-term effects of a new medical treatment; it might become immediately useful as a diagnostic test or new treatment, or it might involve studies of basic biological processes whose practical value may not immediately be apparent.

Each research grant application undergoes a peer review process, first by a panel of technical



experts from outside the government who determine its scientific merit, then by a national advisory council or board composed of members of the public and eminent scientists. They determine the project's merit and relevance to the mission of the funding institute or division. The mission might be to study heart disease, cancer, infectious diseases, diabetes, arthritis, neurological diseases, vision or dental diseases, normal human development, the aging process, the effects of the environment on health, or the fundamental life sciences. Each of the NIH's 12 institutes, three of its six divisions, and the National Library of Medicine (see box) have a national advisory council or board. About 22,000 research and training applications are reviewed annually through this peer review system.

The intramural research program, although it represents only a small part of the total NIH budget, is "the center of the NIH scientific effort, driving the whole vast enterprise along . . . ," according to the well-known essayist, Dr. Lewis Thomas. First-rate scientists are key to the intramural research program. They collaborate with one another regardless of institute affiliation or scientific discipline, and enjoy intellectual freedom to "go" where their research leads them. These explorations range from basic biology to the treatment of major diseases.

Dominating the skyline at the Bethesda headquarters is the Warren Grant Magnuson Clinical Center, a unique research hospital and laboratory complex that rises 14 stories above the NIH campus. This 500-bed facility is designed to allow NIH's intramural scientists to bring research closer to patients' bedsides. Each year about 5,000 individuals come from all over the world to participate, upon referral by their physicians, as inpatients in clinical studies at the NIH. These patients not only receive the finest care, they also contribute to a better understanding of disease. In addition, the Clinical Center accepts about 500 "normal volunteers" annually. These healthy individuals provide scientists with a standard against which to measure the abnormal.

The Ambulatory Care Research Facility (ACRF) provides additional space for laboratories and for the Clinical Center's rapidly growing outpatient program. Recent medical advances allow many people with serious chronic diseases to lead nearly normal lives while their illnesses are being studied on an outpatient basis. Each year there are about 150,000 outpatient visits to the ACRF.

At the opposite end of the NIH campus is the National Library of Medicine, the world's largest medical library. Its collection of 3,500,000 medical books, journals, pamphlets, rare manuscripts,

films, and other items has been called "the Fort Knox of health information" because of the richness of its resources. The Library produces and publishes *Index Medicus*, a comprehensive monthly listing of articles appearing in nearly 3,000 of the world's leading medical journals. The Library also operates a computerized *Index Medicus*, known as MEDLINE, and has pioneered the use of computer-assisted publishing.

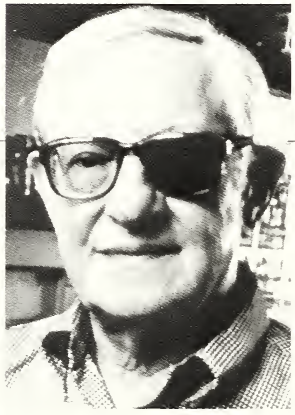
Next to the National Library of Medicine is the 10-story Lister Hill Center that houses the Library's Lister Hill National Center for Biomedical Communications. Also located on the NIH campus is the Fogarty International Center that promotes international cooperation and scholarship in science, and serves as the focus for international biomedical research activities at NIH. Recent additions to the NIH campus include the Mary Woodard Lasker Center for Health Research and Education that houses the NIH-Howard Hughes Medical Institute program for medical students.

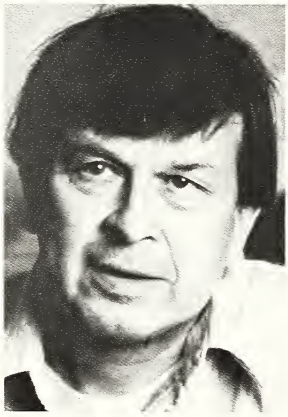
The National Institute of Environmental Health Sciences is located in Research Triangle Park, NC. Other off-campus facilities include the NIH Animal Center in Poolesville, MD; the NIA Gerontology Research Center in Baltimore, MD; the Frederick Cancer Research Facility in Frederick, MD; NIAID's Rocky Mountain Laboratories in Hamilton, MT; and several smaller field stations in the United States and abroad.

The People

Scientific progress depends mainly on the scientist. About 20,000 principal investigators—representing every state in the Union and several foreign countries, every specialty in medicine, and every major university and medical school—receive NIH extramural funding to explore unknown areas of biomedical science. The rosters of those who have received NIH support over the years include the most illustrious physicians and scientists this nation has produced. Among them are over 70 scientists who have won Nobel Prizes for discoveries as diverse as deciphering the genetic code or discovering what causes hepatitis. Four Nobelists made their prize-winning discoveries in NIH laboratories: Drs. D. Carleton Gajdusek, Julius Axelrod, Marshall W. Nirenberg, and Christian B. Anfinsen.

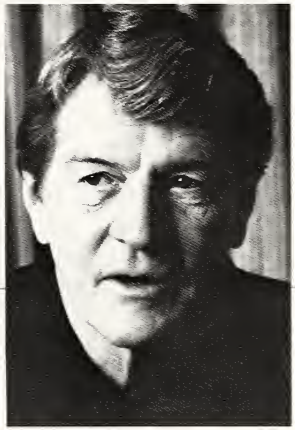
Supporting and conducting these extramural and intramural programs are 14,000 employees of the NIH, about 3,000 of whom hold medical or doctoral degrees. The NIH staff includes intramural scientists, physicians, dentists,





veterinarians, nurses, laboratory, administrative, and support personnel, plus an ever-changing array of research scientists in training. Eminent visitors from the United States and abroad always may be found in the NIH's laboratories, offices, conference rooms, and corridors.

Yet the NIH is more than the sum of its scientists, staff, or even its visitors. NIH is a key element in a partnership that has thrived for decades and includes universities and academic health centers, independent research institutions, and private industry whose research programs and product development activities help make Federally-funded research findings more widely available. The partnership, which has produced many of the medical advances that benefit Americans today, also includes voluntary and professional health organizations, and the Congress that consistently has supported this vast enterprise.



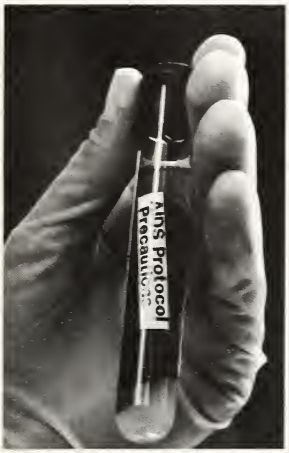
The Results

As a result of the NIH's investment in research, concepts that were not understood and technologies that did not exist as recently as 10 years ago are saving lives today. The NIH has played a major role in making possible the following achievements:

- Mortality from heart disease, the number one killer in the US, has decreased by 34 percent between 1972 and 1984.
- Death rates from stroke are down more than 48 percent during the same period.
- New drug treatments have given children with cancer a better than 50 percent chance of living a normal life.
- A baby born today can expect to live almost three decades longer than one born at the beginning of the century.
- Vaccines protect against infectious diseases that once killed and maimed millions of children and adults.
- Recombinant DNA technology has led to the production of vital substances such as insulin, growth hormone, and monoclonal antibodies that make it possible to treat and diagnose many serious diseases.

The NIH has enabled scientists to learn much since its humble beginnings as a one-room laboratory in 1887. But many discoveries remain

to be made during NIH's second 100 years: better ways to prevent and treat cancer, heart disease, stroke, blindness, arthritis, diabetes, kidney disease, Alzheimer disease, periodontal disease, AIDS, and other unconquered diseases; ways to continue improving the health of infants and children; and more specifics about the aging process and about lifestyle practices that affect health. These are some of the areas where the NIH's investment in health research promises to yield the greatest good for the greatest number of people.



Thus, the NIH offers more than a path to discovery. The greatest gift the NIH has offered—and continues to offer—the American people and the world is *hope* that in the future disease and disability may become problems of the past.

NIH's Bureaus, Institutes, and Divisions

National Cancer Institute

National Eye Institute

National Heart, Lung, and Blood Institute

National Library of Medicine

National Institute on Aging

National Institute of Allergy and Infectious Diseases

National Institute of Arthritis and Musculoskeletal and Skin Diseases

National Institute of Diabetes and Digestive and Kidney Diseases

National Institute of Child Health and Human Development

National Institute of Dental Research

National Institute of Environmental Health Sciences

National Institute of General Medical Sciences

National Institute of Neurological and Communicative Disorders and Stroke

Division of Research Resources

National Center for Nursing Research

John E. Fogarty International Center

Warren Grant Magnuson Clinical Center

Division of Research Grants

Division of Computer Research and Technology

Division of Research Services

Cover:
A crystal of the drug azidothymidine (AZT) is shown. AZT is under study at the National Cancer Institute and the National Institute of Allergy and Infectious Diseases as a treatment for acquired immunodeficiency syndrome.
Photo by: Larry Ostby

1. Scientists in the NCI Laboratory of Tumor Cell Biology compare blood samples containing AIDS virus with those containing other human retroviruses.
Photo by: Francis X. Mahaney, Jr.

2. At the NIH-supported General Clinical Research Center at the University of Michigan, Ann Arbor, a young patient is treated for neuroblastoma. This extremely common tumor of childhood is thought to be of genetic origin.
Photo by: Lin Clayman

3. A participant in the NIH Visiting Program examines petri dishes containing bacteria infected with a virus engineered by recombinant DNA technology to contain human cancer genes.
Photo by: Bill Branson

4. Dr. Joseph James Kinyoun was the first director of the Hygienic Laboratory that later became the National Institutes of Health.
Photo by: Bill Branson

5. An ophthalmologist examines a Pima Indian for diabetic retinopathy at the National Institute of Diabetes and Digestive and Kidney Diseases' Clinical Facility at the Sacaton Indian Reservation, Gila River Indian Community, Arizona.
Photo by: James Coulin Photographs

6. In the Laboratory of Parasitic Diseases at the National Institute of Allergy and Infectious Diseases, Dr. Allen Cheever examines laboratory mice as part of research on better techniques for diagnosing parasitic diseases in humans.
Photo by: Bill Branson

7. Peer-review groups at the NIH evaluate applications from scientists throughout the United States seeking NIH support for their research projects.
Photo by: Bill Branson

8. A laminar flow room provides a sterile environment for patients such as this child who is receiving chemotherapy for rhabdomyosarcoma, a rare childhood tumor usually occurring in skeletal muscles.
NIH Photo

9. Much of the research that NIH supports is conducted at universities, medical schools, hospitals, and other research institutions throughout the United States and abroad.
Photo by: Bill Branson

10. The National Library of Medicine houses the world's largest collection of books and serials in the health sciences.
Photo by: Bill Branson

11. Each year about 150,000 outpatient visits are made to the Ambulatory Care Research Facility, a recent addition to the NIH Clinical Center. The Clinical Center, sometimes called "the heart of the NIH," is the world's largest hospital devoted solely to clinical research.
Photo by: Bill Branson

12. Dr. D. Carleton Gajdusek of the National Institute of Neurological and Communicative Disorders and Stroke proved that kuru, a fatal degenerative disease of the nervous system, is a transmissible slow virus infection. In 1976, he was awarded the Nobel Prize in Physiology or Medicine for this discovery.
Photo by: Mike Mitchell

13. In 1970, Dr. Julius Axelrod received the Nobel Prize in Physiology or Medicine for discoveries of how brain cells (neurons) communicate with one another. His pioneering work has led, among other advances, to better treatment and diagnosis of emotional disorders.
Photo by: Mike Mitchell

14. A research team in the Laboratory of Molecular Biology of the National Cancer Institute examines a flask containing Chinese hamster ovary cells in culture as part of their studies of how cells function in both normal and cancerous states.
Photo by: Bill Branson

15. In 1968, Dr. Marshall W. Nirenberg of the National Heart, Lung, and Blood Institute won the Nobel Prize in Physiology or Medicine for his work in translating the genetic code and its function in protein synthesis.
Photo by: Bill Branson

16. In 1972, NIH scientist Dr. Christian B. Anfinsen received the Nobel Prize in Chemistry for determining that the three-dimensional structure of a protein is determined by the arrangement of its constituent amino acids.
Photo by: Mike Mitchell

17. A research scientist from the National Institute of Dental Research uses computers to measure miniscule changes in teeth and supporting tissues that are not detectable with conventional dental x-rays.
Photo by: Bill Branson

18. An example of how body fluids from AIDS patients are handled carefully by laboratory personnel at the National Institutes of Health.
NIH Photo

19. Research supported by the National Institute on Aging shows that lifelong exercise can improve heart and lung performance, strengthen bones, help protect against cardiovascular disease, and reduce levels of fat and insulin in the blood.
Photo by: Esther McBride

20. A research scientist from the National Institute of Diabetes and Digestive and Kidney Diseases builds a model to study the three-dimensional structure of DNA.
Photo by: Mike Mitchell

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